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LEE & HAYES PLLC
421 W RIVERSIDE AVENUE SUITE 500
SPOKANE, WA 99201

EXAMINER	
WONG, ALLEN C	

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2621	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/674,932	LU ET AL.	
	Examiner	Art Unit	
	Allen Wong	2621	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 May 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-15 and 17-35* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-15 and 17-35* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims 11-14, 21, 22 and 28-30 have been read and considered but are moot in view of the new ground(s) of rejection.

2. Applicant's arguments filed 5/29/07 have been fully considered but they are not persuasive.

Regarding the 35 U.S.C. 101 rejection, although the applicant has amended claim 25, however, the preamble of claim 25 still needs to be changed to state that the instructions are computer executable to conform with current 35 U.S.C.101 standards. It is suggested that the preamble of claim 25 should be rewritten as, "a computer readable medium encoded with computer executable instructions for..." Appropriate correction is needed.

Regarding lines 2-7 on page 14 of applicant's remarks, applicant argues that Cham does not disclose approximating at least one non-power-of-two element of a matrix as a power-of-2 element such that all elements of a resultant matrix are power-of-2 elements, as recited in claim 1. The examiner respectfully disagrees. On page 277, 1st column, section 2, Cham discloses that 2^m elements can be applied. On the last line of page 281 to line 2 on page 282, Cham discloses the 2^m transform or 2-power transform. Also, on page 278, 1st column, Cham discloses that in conditions (3) and (4), wherein the elements a, b, c, d, e and f can have an infinite number or amount of new orthogonal transforms to meets the conditions specified in that at least one non-power-of-2 element of a matrix can be approximated to yield a resultant matrix as shown in

table 2 in page 277. In other words, a, b, c, d, e or f can be of the non-power-of-2 elements that can be approximated to a resultant matrix with all power-of-two elements since there are infinite possibilities of values that can meet the conditions as specified in Cham's (3) and (4) for the values of the variables a, b, c, d, e and f.

Further, both the applicant's claim 10 and Cham's disclosure show the matrix with the same elements in that elements of the matrix a, b, c, d, e and f do have a certain relationship, existing in matrix, in that a*b = a*c + b*d + c*d, and a>=b>=c>=d, e>=f (see Cham 278, 1st column, conditions (3) and (4)).

As far as the specifics of the values for "power-of-2 elements", the applicant claimed that a=b=2, c=1, d=1/4, e=2 and f=1, claim 1 does not specify such limitations, whereas dependent claims 13-14 do mention those specific limitations. See the 35 U.S.C.103 rejection below of Cham in view of Lo for explanation.

Regarding lines 6-9 on page 15 of applicant's remarks, applicant mentions that Cham has all matrices in that e = 3 or that at least one of a, b, c or d is an odd value, and that there is no X integer value to meet the equation $2^X = 3$. On page 277, 1st column, section 2, Cham discloses that 2^m elements can be applied. On the last line of page 281 to line 2 on page 282, Cham discloses the 2^m transform or 2-power transform. Also, on page 278, 1st column, Cham discloses that in conditions (3) and (4), wherein the elements a, b, c, d, e and f can have an infinite number or amount of new orthogonal transforms to meets the conditions specified in that at least one non-power-of-2 element of a matrix can be approximated to yield a resultant matrix as shown in table 2 in page 277. In other words, a, b, c, d, e or f can be of the non-power-of-2

elements that can be approximated to a resultant matrix with all power-of-two elements since there are infinite possibilities of values that can meet the conditions as specified in Cham's (3) and (4) for the values of the variables a, b, c, d, e and f.

Dependent claims 2-10 are rejected for at least similar reasons as claim 1.

Regarding lines 3-8 on page 16 of applicant's remarks, applicant similarly argues that claim 15, like claim 1, is not disclosed in that the transformer to perform the 2-power transform using a symmetrical matrix in which all elements are expressed as power-of-2 elements. The examiner respectfully disagrees. On page 277, 1st column, section 2, Cham discloses that 2^m elements can be applied. On the last line of page 281 to line 2 on page 282, Cham discloses the 2^m transform or 2-power transform. Also, on page 278, 1st column, Cham discloses that in conditions (3) and (4), wherein the elements a, b, c, d, e and f can have an infinite number or amount of new orthogonal transforms to meets the conditions specified in that at least one non-power-of-2 element of a matrix can be approximated to yield a resultant matrix as shown in table 2 in page 277. In other words, a, b, c, d, e or f can be of the non-power-of-2 elements that can be approximated to a resultant matrix with all power-of-two elements since there are infinite possibilities of values that can meet the conditions as specified in Cham's (3) and (4) for the values of the variables a, b, c, d, e and f.

Dependent claims 17-20 and 23-24 are rejected for at least similar reasons as claim 15.

Regarding line 22 on page 16 to line 1 on page 17 of applicant's remarks, applicant states that Cham does not disclose claim 25 in that the matrix such that all

elements in the matrix are expressed as power-of-2 coefficients. The examiner respectfully disagrees.

Dependent claims 26-27 and 31-34 are rejected for at least similar reasons as claim 25.

Regarding lines 17-22 on page 17 of applicant's remarks, applicant states that Cham does not disclose claim 35, and the means for performing a 2-power transform on an incoming array of pixels, wherein all elements of the 2-power transform are equal to power-of-2 elements. The examiner respectfully disagrees. On page 277, 1st column, section 2, Cham discloses that 2^m elements can be applied. On the last line of page 281 to line 2 on page 282, Cham discloses the 2^m transform or 2-power transform. Also, on page 278, 1st column, Cham discloses that in conditions (3) and (4), wherein the elements a, b, c, d, e and f can have an infinite number or amount of new orthogonal transforms to meets the conditions specified in that at least one non-power-of-2 element of a matrix can be approximated to yield a resultant matrix as shown in table 2 in page 277. In other words, a, b, c, d, e or f can be of the non-power-of-2 elements that can be approximated to a resultant matrix with all power-of-two elements since there are infinite possibilities of values that can meet the conditions as specified in Cham's (3) and (4) for the values of the variables a, b, c, d, e and f.

Thus, the rejection is maintained.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

The USPTO "Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility" (Official Gazette notice of 22 November 2005), Annex IV, reads as follows:

> Descriptive material can be characterized as either "functional descriptive material" or "nonfunctional descriptive material." In this context, "functional descriptive material" consists of data structures and computer programs which impart functionality when employed as a computer component. (The definition of "data structure" is "a physical or logical relationship among data elements, designed to support specific data manipulation functions." The New IEEE Standard Dictionary of Electrical and Electronics Terms 308 (5th ed. 1993).) "Nonfunctional descriptive material" includes but is not limited to music, literary works and a compilation or mere arrangement of data.
>
> When functional descriptive material is recorded on some computer-readable medium it becomes structurally and functionally interrelated to the medium and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized. Compare In re Lowry, 32 F.3d 1579, 1583-84, 32 USPQ2d 1031, 1035 (Fed. Cir. 1994) (claim to data structure stored on a computer readable medium that increases computer efficiency held statutory) and Warmerdam, 33 F.3d at 1360-61, 31 USPQ2d at 1759 (claim to computer having a specific data structure stored in memory held statutory product-by-process claim) with Warmerdam, 33 F.3d at 1361, 31 USPQ2d at 1760 (claim to a data structure per se held nonstatutory).
>
> In contrast, a claimed computer-readable medium encoded with a computer program is a computer element which defines structural and functional interrelationships between the computer program and the rest of the computer which permit the computer program's functionality to be realized, and is thus statutory. See Lowry, 32 F.3d at 1583-84, 32 USPQ2d at 1035.

Claims 25-34 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter as follows. Claim 25 defines a "computer-readable medium having one or more instructions causing one or more processors to..." embodying functional descriptive material. However, the claim does not define a computer-readable medium or memory and is thus non-statutory for that reason (i.e., "When functional descriptive material is recorded on some computer-readable medium it becomes structurally and functionally interrelated to the medium and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized" – Guidelines Annex IV). That is, the scope of the presently claimed a "computer-readable medium having one or more instructions causing one or more

processors to..." can range from paper on which the program is written, to a program simply contemplated and memorized by a person. The examiner suggests amending the claim to embody the program on "computer-readable medium" or equivalent in order to make the claim statutory. Any amendment to the claim should be commensurate with its corresponding disclosure.

The preamble can be rewritten as "a computer readable medium *encoded with* computer executable instructions for..."

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-10, 15, 17-20, 23-27 and 31-35 are rejected under 35 U.S.C. 102(b) as being anticipated by Cham ("Development of Integer Cosine Transforms by the principle of Dyadic Symmetry", IEE Proceedings, Vol.136, Pt.1, No.4, pages 276-282).

Regarding claim 1, Cham discloses a method, comprising: approximating at least one non-power-of-2 element of a matrix as a power-of-2 element such that all elements of a resultant matrix are power-of-2 elements (page 277, 1st column, section 2, Cham discloses that 2^m elements can be applied, on page 281, last line to page 282, line 2, Cham discloses the 2^m transform or 2-power transform, and page 278, 1st column, note (3) and (4), wherein the elements a, b, c, d, e and f can have an infinite number or amount of new orthogonal transforms to meets the conditions specified in

that at least one non-power-of-2 element of a matrix can be approximated to yield a resultant matrix as shown in table 2 in page 277); and encoding video data using the resultant matrix (page 281, Cham's fig.5 is a transform encoding system used to encode video data using the resultant matrix [T]).

Regarding claim 2, Cham discloses the DCT matrix (page 276, column 1, 2nd paragraph).

Regarding claim 3, Cham discloses approximation including manipulating an order of the one or more elements in a particular row of the matrix (page 276, column 1, 2nd paragraph, Cham discloses order-n DCT).

Regarding claim 4, Cham discloses approximation including manipulating signs of one or more elements in a particular row of the matrix (table 2, note use of negative signs of certain elements are manipulated for at least one or more elements).

Regarding claim 5, Cham discloses approximation including manipulating order and signs of one of the elements in a particular row of the matrix (page 276, column 1, 2nd paragraph, Cham discloses order-n DCT, and in table 2, note use of negative signs of certain elements are manipulated for at least one or more elements).

Regarding claims 6-7, Cham discloses approximating includes floating point coefficients as power of 2 coefficients that preserve a threshold relationship or relative ratio among the floating point values (note the elements of the matrix a, b, c, d, e and f do have a certain relationship, existing in matrix, in that a*b = a*c + b*d + c*d, and a>=b>=c>=d, e>=f).

Regarding claim 8, Cham discloses there are row vectors or basis with unity magnitude, and a resultant matrix (see page 277, table 2 in that there is a unity row in the matrix, see page 278, 1st column, note (3) and (4)).

Regarding claim 9, Cham discloses row vectors of the resultant matrix are orthogonal (see page 277, table 2, see page 278, 1st column, note (3), (4), and (5)).

Regarding claim 10, Cham discloses the resultant matrix (see page 277, table 2, see page 278, 1st column, note (3) and (4)).

Regarding claim 15, Cham discloses an image data encoding apparatus, comprising: a transformer to perform a 2-power transform on an incoming array of pixels, the transformer to perform the 2-power transform using a symmetrical matrix in which all elements are expressed as power-of-2 elements (page 277, 1st column, section 2, Cham discloses that 2^m elements can be applied, on page 281, last line to page 282, line 2, Cham discloses the 2^m transform or 2-power transform, and that page 278, 1st column, note (3) and (4), wherein the elements a, b, c, d, e and f can have an infinite number or amount of new orthogonal transforms to meets the conditions specified in that at least one non-power-of-2 element of a matrix can be approximated to yield a resultant matrix as shown in table 2 in page 277); a quantizer to quantize the transformer result (page 281, fig.5, note "quantiser #0-7"); and an inverse transformer to perform an inverse 2-power transform on the quantizer result (page 281, 1st column, line 24-26, Cham discloses the use of an inverse transform, note (8)).

Regarding claim 17, Cham discloses wherein an order of two or more elements in a particular row of the matrix have been changed (page 276, column 1, 2nd paragraph, Cham discloses order-n DCT).

Regarding claim 18, Cham discloses wherein the signs of one or more elements in a particular row of the matrix have been changed (table 2, note use of negative signs of certain elements are manipulated for at least one or more elements).

Regarding claim 19, Cham discloses symmetrical matrix is DCT matrix template (page 276, column 1, 2nd paragraph).

Regarding claim 20, Cham discloses the resultant matrix (see page 277, table 2, see page 278, 1st column, note (3) and (4)).

Regarding claim 23, Cham discloses there are row vectors or basis with unity magnitude, and a resultant matrix (see page 277, table 2 in that there is a unity row in the matrix, see page 278, 1st column, note (3) and (4)).

Regarding claim 24, Cham discloses row vectors of the resultant matrix are orthogonal (see page 277, table 2, see page 278, 1st column, note (3) and (4)).

Regarding claim 25, Cham discloses a computer-readable storage medium encoded with one or more instructions, the one more instructions configured to cause one or more processors to: create a matrix such that all elements in the matrix are expressed as power-of-2 coefficients (page 277, 1st column, section 2, Cham discloses that 2^m elements can be applied, on page 281, last line to page 282, line 2, Cham discloses the 2^m transform or 2-power transform, and that page 278, 1st column, note (3) and (4), wherein the elements a, b, c, d, e and f can have an infinite number or

amount of new orthogonal transforms to meets the conditions specified in that at least one non-power-of-2 element of a matrix can be approximated to yield a resultant matrix as shown in table 2 in page 277); and encode video data using the resultant matrix (page 281, Cham's fig.5 is a transform encoding system used to encode video data using the resultant matrix [T]).

Regarding claim 26, Cham discloses approximation including manipulating an order of the one or more elements in a particular row of the matrix (page 276, column 1, 2nd paragraph, Cham discloses order-n DCT).

Regarding claim 27, Cham discloses changing signs of one or more elements in a particular row of the template matrix (table 2, note use of negative signs of certain elements are manipulated for at least one or more elements).

Regarding claims 31 and 32, Cham discloses the template matrix is a DCT matrix (page 276, column 1, 2nd paragraph).

Regarding claim 33, Cham discloses there are row vectors or basis with unity magnitude, and a resultant matrix (see page 277, table 2 in that there is a unity row in the matrix, see page 278, 1st column, note (3) and (4)).

Regarding claim 34, Cham discloses row vectors of the resultant matrix are orthogonal (see page 277, table 2, see page 278, 1st column, note (3) and (4)).

Regarding claim 35, Cham discloses an image data encoding apparatus, comprising: means for performing a 2-power transform on an incoming array of pixels, wherein all elements of the 2-power transform are equal to power-of-two elements (page 277, 1st column, section 2, Cham discloses that 2^m elements can be applied, on

page 281, last line to page 282, line 2, Cham discloses the 2^m transform or 2-power transform, and that page 278, 1st column, note (3) and (4), wherein the elements a, b, c, d, e and f can have an infinite number or amount of new orthogonal transforms to meets the conditions specified in that at least one non-power-of-2 element of a matrix can be approximated to yield a resultant matrix as shown in table 2 in page 277); means for quantizing the transformer result (page 281, fig.5, note "quantiser #0-7"); and means for performing an inverse 2-power transform on the quantizer result (page 281, 1st column, line 24-26, Cham discloses the use of an inverse transform, note (8)).

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 11-14, 21, 22 and 28-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cham ("Development of Integer Cosine Transforms by the principle of Dyadic Symmetry", IEE Proceedings, Vol.136, Pt.1, No.4, pages 276-282) in view of Lo ("Simple Orthogonal Transform for Image Coding", Proceedings of IEEE Singapore International Conference, Volume 1, pages 465-469).

Cham discloses the resultant matrix (see page 277, table 2, see page 278, 1st column, note (3) and (4)), with conditions floating point coefficients a, b, c, d, e and f, where a*b = a*c + b*d + c*d, and a>=b>=c>=d, e>=f (note the elements of the matrix a, b, c, d, e and f do have a certain relationship, existing in matrix, in that a*b = a*c + b*d

+ c*d, and a>=b>=c>=d, e>=f), and that there can be 2^m elements (page 277, 1st column, section 2). Cham does not specifically disclose a=b=2, c=1, d= ¼, e=2, f=1. However, the elements of Cham can be easily changed or manipulated to where a = b = 2^1 = 2, c = 2^0 = 1, d = 2^{-2} = ¼, e = 2^1 = 2, f = 2^0 = 1, in that the power of 2 (2^m where m is an integer, positive or negative whole number) elements can be changed since the implementation and utilization of positive and negative whole numbers to change the elements or values are well known, as illustrated in Lo (page 467, section 3, 2nd column, Lo discloses the [DT_8] matrix shows the use of elements in that there are fractional values ½ and ¼ by easily manipulating the power of 2 by using binary shift operations for creating orthogonal matrices with certain symmetrical properties that establish a relative ratio and threshold relationship). Therefore, it would have been obvious to one of ordinary skill in the art to combine the teachings of Cham and Lo, as a whole, for manipulating the elements of the numerical values to conform to certain relationship so as to perform simple DCT transform function in order to efficiently encode image data while preserving image quality.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Allen Wong whose telephone number is (571) 272-7341. The examiner can normally be reached on Mondays to Thursdays from 8am-6pm Flextime.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John W. Miller can be reached on (571) 272-7353. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Allen Wong
Primary Examiner
Art Unit 2621

AW
8/6/07